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Rationalization Plans for Hospital Beds in Egypt

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Partnerships for Health Reform

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Abstract

This report examines the adequacy of hospital bed supply in Egypt and in each of its governorates. It represents a plan for rationalizing hospital bed supply in Egypt, noting where there are too many beds, where there are not enough, and where capital investment should be heading. It also provides a quantitative and rational basis for the Ministry of Health and Population to evaluate the reasonableness of the requests by governorates.

The rationalization plan is based upon estimates of bed needs, and the gaps that exist between these needs and the actual supply of beds. Bed needs are determined by means of an algebraic formula that expresses assumptions about the preferred patterns of hospital care seeking behavior, preferred medical practice patterns, and preferred patterns of hospital management and capacity utilization. These norms were developed from extensive analysis of Egyptian data by two panels of experts who reviewed and verified the values for this planning exercise.

In summary, Egypt must rationalize bed supply because there are too many underutilized beds, particularly in urban portions of the governorates. The priorities for rationalization call for new construction in some areas, and bed reductions in others. Overall, this plan is moving Egypt toward a bed standard in the 1.4 to 1.6 range, down from 2.1 today—while equalizing utilization across urban and rural areas (at a higher level), improving capacity utilization, and rationalizing the flow of patients across geography to get inpatient care.

The plan proposes that the action pertaining to implementation in the rural areas be preceded by the development of a strategy for rural health care so that policy to provide better access to inpatient care in these areas is properly integrated and accounts for the needs to redistribute medical manpower as well as beds.

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Acronyms

CAPMAS	Central Agency for Population, Mobilization, and Statistics
DDM	Data for Decision Making
HIO	Health Insurance Organization
HIS	Health Information Systems
LE	Egyptian Pound
MIS	Management Information Systems
MOHP	Ministry of Health and Population
NICHP	National Information Center for Health and Population
PHR	Partnerships for Health Reform
TSO	Technical Support Office
TST	Technical Support Team
USAID	United States Agency for International Development

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Executive Summary

To determine the appropriateness of the supply of hospital beds throughout Egypt, the country's Ministry of Health and Population and the Partnerships for Health Reform collaborated to design a plan for rationalizing hospital bed supply in Egypt. The plan is based upon estimates of bed needs and the gaps between these needs and actual supply. Bed needs are determined by an algebraic formula expressing assumptions—about preferred patterns of hospital care seeking behavior, medical practice patterns, hospital management, and capacity utilization—developed from extensive analysis of Egyptian data.

Egypt presently has about 2.1 beds per 1,000 persons, a number comparable to neighboring countries and others with similar levels of economic development. Overall this supply is very underutilized, and there are gaps in utilization between rich and poor and between urban and rural areas: The occupancy rate in urban areas appears to be about 40 percent to 56 percent; in rural facilities it is as low as 0 percent. This is due in great part to an inadequate supply of physicians in rural areas, to low capacity utilization because physicians have financial incentives to treat patients in clinics, and to facility management which has no incentive to take beds off-line when they are not used or are in disrepair.

Unlike current practice, which looks to expected demand to estimate bed supply, this rationalization plan is based upon normative estimates of bed needs. Needs are determined by means of an algebraic formula expressing assumptions about the underlying determinants of bed needs: future population; norms for utilization of bed days of care per capita; norms for referral/migration of persons between rural and urban areas and between governorates; norms for hospital occupancy. Additional norms for useful facility life, minimum economic facility size, and travel time minimums are also useful for extending the bed need implications to estimating construction requirements, and for establishing specific project approval criteria.

The current study uses four types of norms, or model parameters: utilization and care seeking behavior norms, which are largely determined by the way consumers choose to seek care (or not) and the related volume of service; practice pattern norms, which refer to the way in which care volumes are allocated to local facilities, other facilities within the governorate, and cross-governorate migration or referrals; operational efficiency norms, where matters of concern and control of hospital managers are capacity utilization (occupancy rate) and useful life of facilities; and policy objectives, where several major drivers of hospital needs are percentage of births in hospitals, availability of physicians (in rural areas), the levels of service quality in hospitals, and penetration of primary care. The study adjusts the norms to create three scenarios for future bed needs.

Utilization norms in the form of days of care per capita are used to estimate bed needs. When investigating this issue, the study found that bed days and length of stay data revealed significant gaps in utilization, suggesting limiting barriers such as income and distance. Opinion data confirm that economic barriers are the key reason persons refrain from using hospitals when need arises. This implies that there is certainly some unmet need for care, especially among the rural poor, the uninsured, and other economically stressed groups and that care is sought only after the average severity of admitted cases is quite high.

Care migration pattern norms are essential to understanding where beds are needed. Scenarios 1 and 2 consider two different norms about how care for rural populations is to be provided. Scenario 1 has limited improvements in usage equity and significant management improvement without major shifts in usage; and there is reallocation of usage across governorates for migration. In Scenario 2, which assumes hospital organizational reform, there are properly sized and managed hospitals in self-sufficient governorates with equity in usage; occupancy norms are 0.6 for rural and 0.7 for urban; rural populations are served locally for only those services requiring a nearby facility; and governorates are self-sufficient (there is no cross-governorates leakage or migration). In Scenario 3, there is care model reform, which achieves organizational reforms and improved utilization of hospital services through better primary care and more efficient length of stays.

In considering migration, Egyptian governorates were classified into four groups: those with heavy incoming patient flows; those with significant reputations as specialty centers; those likely to have many residents who seek care elsewhere; and others. Populations in these places were adjusted up or down by a "factor" in order to create an estimate of the "effective population" treated by the governorate's hospitals.

While Scenario 1 has more modest rural utilization norms, it also has more modest occupancy norms for both urban and rural areas. Replacement and renovation will have to be considered together with overall rationalization planning in investment planning. Age of plant—Egyptian experts put useful facility life at 20 years—is also be an important consideration in any particular year's investment plan.

Using the model and norms, bed needs in Egypt were calculated for year 2003. Estimates for total beds in both Scenarios 1 and 2 were around 100,000, a 25 percent decrease from today's 125,000. This bed need level would result in about 1.5 beds per 1,000 persons, against the current level of about 2.1.

In order to equalize utilization across urban and rural areas at a higher level, improve capacity utilization, and rationalize patient flow across geography, the priorities for rationalization call for new construction in some areas and bed reductions in others. Bed surpluses are primarily an urban problem, and bed shortages are primarily a rural problem, although this is not always the case. Overall, there is a 25-30 percent surplus in urban areas, a 10 percent shortage in rural areas. Relieving the "mismatch" would require construction of 12,707 beds, mostly in rural areas, and elimination of 40,494 beds, mostly in urban areas. Several governorates have potential for shifting beds from areas of surplus to areas of shortage.

This study points out its own limitations—lack of data prevented it from evaluating beds by payer and by specialty; the examination of governorate bed needs by population excluded peculiarities of geographic isolation, epidemiology, and culture—and it enumerates several issues that the Egyptian health sector must deal with before implementing a new bed needs plan. For example, it is not possible to achieve rural targets for inpatient usage by simply constructing beds. As noted earlier, in many regions, hospital utilization is below norms for lack of physicians, not for lack of beds. The implementation plan for rural areas should be held until an integrated strategy for rural health services is developed. This strategy would have components such as identification of communities without hospital services, of nearest hospitals with doctors for all rural communities, and of policy instruments for attracting physicians to rural locations; moving medical education to the community; consolidating services into larger, multi-village facilities; and providing financial incentives for creating care systems. Family medicine clinics should bring professional health services to populations where physicians will never be retained and use observation beds, expanded roles for nurses, and referrals.

Budgeting and financial incentives for managers also are needed to help rationalize hospital bed supply. Presently, managers are provided incentives to have as many beds as they can. This could be changed if, for example, they were given fixed budgets based upon patient volume, or fixed amounts per patient treated.

The computational model developed to support this work is still being refined. It will be available from the PHR Resource Center.

1. Introduction

This report examines the adequacy of hospital bed supply in Egypt and in each of the country's governorates. It represents a plan for rationalizing hospital bed supply in Egypt, noting where there are too many beds, where there are not enough, and where capital investment should be heading. It also provides a quantitative and rational basis for the Egyptian Ministry of Health and Population (MOHP) to evaluate the reasonableness of the requests by governorates for investment plans involving new beds. Like other similar plans, it shows goals for adequate supply and distribution of beds, and gaps between these goals and the existing stock of beds. Doing this first requires establishment of assumptions or standards about bed utilization and management efficiency from which to derive a corresponding estimate of "adequate" bed supply. This kind of planning, where bed needs are compared to bed supply, is a common analytical ingredient in health policy and planning in most countries. It is particularly important to be explicit about bed need objectives and to move to rationalize bed supply based on these objectives, since resources are very limited in Egypt and the consequences of investment mistakes would be so crucial.

The rationalization plan considers all of Egypt's population, and all related bed needs. Requirements for beds for specific payers are not considered here because data is insufficient for some payers. The analytic work computes bed needs for the MOHP based upon current levels of MOHP share in bed days for urban and rural areas (based on the Data for Decision Making [DDM] project's 44 percent for urban, 64 percent for rural[1]). Very tentative data on MOHP share are shown in Annex B. These calculations need to be refined and made specific to each governorate before the bed need values for each can be made reliable.

The plan does not consider the adequacy of bed distribution by specialty. Such an assessment is not possible because there are many general hospitals where bed supply by specialty is not a meaningful concept. It does, however, include the specialty facilities that serve epidemic demands (chest, fever), where occupancy is very low. Accommodations to this may need to be made in applying (implementing) the governorate-specific bed need standards.

The rationalization plan has several objectives. These are:

- To offer objectives for the hospital bed supply in Egypt and its distribution across governorates
- To establish the methods on which specific norms and standards pertaining to the objectives were based
- To discuss the possible mechanisms by which the objectives can be implemented

[1] The Data for Decision Making project carried out a survey on health care utilization and expenditures in Egypt in 1994-95. Results of the survey are described in a Partnerships for Health Reform report: Berman, P., Nandakumar, A.K., and Yip, W. 1998. *Health Care Utilization and Expenditures in the Arab Republic of Egypt*. Technical Report 25. Bethesda, Maryland: Partnerships for Health Reform, Abt Associates Inc.

The remaining chapters of this rationalization plan discuss the following topics: Chapter 2 provides background on bed supply in Egypt and the need for a rationalization plan. Chapter 3 enumerates the objectives of hospital bed supply policy. Chapter 4 examines the method used in estimating and verifying an adequate supply of bed. Chapter 5 discusses norms and standards. Chapter 6 sets out overall bed supply adequacy, and chapter 7 looks at distributional adequacy across governorates. Chapter 8 concludes the report with issues and tactics for implementing the plan.

This bed needs model activity started in July 1998 with meetings between Gary Gaumer, Ph.D., of the Partnerships for Health Reform (PHR) and representatives of the MOHP Planning Department, Technical Support Office (TSO), and National Information Center for Health and Population (NICHP); the Health Insurance Organization (HIO); and the Alexandria Health Information Center. Additional PHR staff joined the effort. In addition to their meetings, Dr. Gaumer and other plan developers made field visits to hospitals and clinics in Alexandria. In September 1998 a bed needs committee was formed. An initial bed needs model was designed in July 1998 and reviewed by the bed needs committee, the TSO, and the MOHP Curative Care Department as well as by the two review panels discussed in Chapter 4 of this report.

A computational model was developed to support this work; it currently is being refined. The model allows the analyst to make computations using various assumptions about standards, population, policy scenarios, and other issues. The model will be available in electronic form from the PHR Resource Center in October 1999.

2. Background on Bed Supply in Egypt

Egypt has today about 125,000 inpatient beds. This number does not include observational beds in outpatient units, bassinets (incubators), or ICU/CCU beds. This bed total is about 2.1 beds per 1,000 persons, a number comparable to neighboring countries and others with similar levels of economic development. These data are shown in Tables 1a and 1b.

Table 1a: Bed Supply Data for Egypt

	Urban	Rural*	Total
Beds	94,330	31,391	125,721
Beds/Capita	0.9	3.7	2.1
Occupancy			39%**

*Rural beds include rural hospitals, rural groups as well as district hospitals as they are initially serving rural areas.
**MOHP 1996

Table 1b: Beds per Capita in Egypt and Other Countries

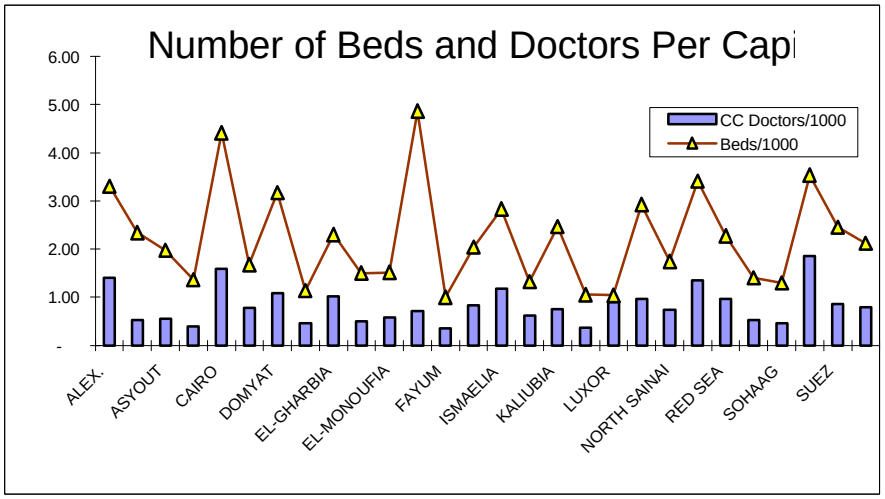
	Beds/Capita
Yemen	0.8
Morocco	1.1
Jordan	1.6
Tunisia	1.8
Egypt	2.1
United Arab Emirates	3.1

Source: NICHP, January 1st, 1998.

Egypt's bed supply is very underutilized. Occupancy rates in MOHP facilities, which represent about 70 percent of Egypt's beds, appear to be about 40 percent. Occupancy in other facilities (HIO, private, and others) may be somewhat higher, though the only data (from HIO) shows that occupancy is about 56 percent. Occupancy rates in rural facilities is known (anecdotally) to be very low, approaching 0 percent in some types of facilities. These low rates seem to be the result of an inadequate supply of physicians to promote utilization of the facilities. They are also believed to be low because physicians have financial incentives to treat patients in clinics (rather than admitting them), because of perceptions of poor quality (which would suppress utilization) and because managers have no incentive to take beds off-line when they are not used or are in disrepair (since bed count determines payment, in part).

Extreme gaps exist in bed endowments between governorates. Table 1a shows that bed availability to populations in rural areas is only 24 percent of that of urban populations. Across governorates, beds per 1,000 persons now varies from a high of around 4.5 in Cairo and El-Wady El-Gedeid) to a low of about 1.0 in Kena and Luxor (see Annex A). Figure 1 below illustrates these disparities in beds and physicians.

Figure 1: Number of Beds and Doctors per Capita



There are also large gaps in hospital usage between rich and poor, and between urban and rural regions. Table 2 shows bed days per 1,000 persons as measured by the DDM survey of households. Average usage of persons in the top two quintiles of the surveyed population (income exceeds 1,114 Egyptian pounds [LE]/per year per household) is about 359 days per 1,000 persons, while the 60 percent of sampled households with lower incomes had utilization of only about 210 days.

Table 2: Days of Hospital Care per 1,000 Persons (length of stay)

	Yearly Income > 1114 L.E.	Yearly Income <1114 L. E.
Urban	361 (8.6)	331 (10.4)
Rural	357 (13.8)	154 (10.1)

Source: DDM Household survey 1994-1995

The persons who have lower incomes and who are residents of rural areas have usage rates of only 157 days per 1,000. Tables of utilization, provided in Annex F, also demonstrate that the lower income segments of the population have poorer self-reported health status. If adjustment is made in utilization for health status differences between the upper and lower income segments, the usage rate differential widens. These differences are believed to be related, in significant part, to availability of hospital services (including physicians). Certain demand differences are also believed to exist, particularly in terms of barriers-to-demand due to ability to pay and some cultural differences.

The Egyptian government's role in making correct, targeted, and high yield investments in hospital facilities is critical. Mistakes are costly: funds that are tied up in underutilized new beds have considerable consequence in terms of alternative uses in Egypt. This is because the government is both the safety-net health care provider for the poor (who have few alternatives for choosing hospitals) and the only substantial new investor in beds.

3. Objectives of Hospital Bed Supply Policy

The objectives of the hospital services program in Egypt and the bed rationalization plan are fourfold:

- To strive always to provide equal access to hospital services for all Egyptians
- To make governorates as self-sufficient as possible in providing all levels of hospital care
- To achieve the highest possible social returns on construction investments by building efficiently sized facilities, operated to high capacity, and managed to high levels of service quality
- To give first priority in MOHP investment priorities to those populations with hospital care needs that are unmet by other means

The plan attempts to estimate the bed need requirements that are consistent with these concepts, and compute the excess (or shortages) of beds that result from such standards.

4. Method of Estimating and Verifying Adequate Supply of Beds

4.1 A Model for Estimating Bed Needs

As noted above, this bed rationalization plan is based upon estimates of bed needs, and the gaps that exist between these needs and the actual supply of beds. As such, the plan treats bed needs as norms that define what bed supply would be required for Egypt to support the preferred patterns of hospital care seeking behavior, preferred medical practice patterns, and preferred patterns of hospital management and capacity utilization. Alternatively, the plan could rest on a definition of bed requirements that is the expected demand for hospital services. This alternative would track more closely with observed pattern of historical usage and would internalize certain existing barriers to preferred behaviors, barriers such as consumer inability to pay and weak efficiency incentives for doctors and hospital managers. While such a standard is "realistic," it fails to provide a vision of what might be, a necessary part of policy planning work in support of rationalization. Indeed, rationalization would not be necessary if the marketplace and history had been more equitable and more efficient in guiding the investments in hospital beds in the past. Hence, the plan is based upon normative estimates of bed needs rather than on a standard of expected demand.

Bed needs for a population are computed by means of an algebraic formula (see Figure 2) that expresses each of the assumptions about the underlying determinants of bed needs. These factors are:

- Future population
- Norms for referral/migration of persons between rural and urban areas and between governorates
- Norms for utilization of bed days of care per capita
- Norms for hospital occupancy

Additional norms for useful facility life, minimum economic facility size, and travel time minimums are also useful for extending the bed need implications to estimating construction requirements, and for establishing specific project approval criteria.

Figure 2: Equation 1

BN = Pn * PAF * U * 1/occ

Where BN = bed needs in a region
Pn = population in the nth year
PAF= population adjustment factors for migration and referral within and across governorates
U = norm for utilization of hospitals measured as bed days per capita
Occ = norm for average hospital occupancy rate

4.1.1 Geographic Unit of the Model

This model is used to measure bed needs in each governorate, and for all Egypt. Each governorate is divided into two regions, urban and rural, with bed needs computed for each. The urban and rural segments of each governorate are taken from the Central Agency for Population, Mobilization and Statistics (CAPMAS) census sampling strategy (see below). Bed needs for Egypt as a whole is the sum of the governorates.

Luxor is a special governorate, and it required somewhat special treatment. It is treated here as an urban area even though some of the small facilities are managed as rural hospitals. All beds and all population are considered "urban" for purposes of computing bed needs in as much as the single small city is the only population area in the governorate.

The choice of the governorate as the geographic unit is not ideal. By using such a large region, isolated situations of extreme shortage or surplus in one locale may be masked by an offsetting situation in another locale, once they are averaged together. Unfortunately, existing data do not permit bed supply to be linked with information on population within places (cities, towns, and villages). This is the most critical limitation of this model for estimating and evaluating the distributional aspects of bed needs.

4.1.2 Measuring Excess (Shortage) of Beds

Differences between the current supply and the computed bed need is an indication of excess (or shortage). This computation is made using current beds (1998) and bed needs based upon the expected population in the year 2003. This allows the bed needs calculation, and the indication of surplus or excess, to be consistent with the five-year investment-planning horizon. In each region, the extent of mismatch between supply of beds and bed need is characterized as:

Shortage area: where beds are less than 85 percent of bed needs

Near balance area: where beds exceed 85 percent of bed needs, but are no more than 115 percent of bed needs

Surplus area: where beds exceed 115 percent of bed needs

4.1.3 Scenarios

Estimates of bed needs are made under different assumptions about underlying norms and market and policy environments. Three scenarios are used in this plan to understand the possible future requirements for beds.

Scenario 1

- Achieving limited improvements in usage equity, significant management improvement, without major shifts in usage
- Rural populations served locally for 67 percent of services (approximately current practice)
- Reallocation of usage across governorates for migration
- Utilization norms of 350 days per 1,000 in urban, 250 in rural
- Occupancy norms of 0.6 for urban and 0.5 rural

Scenario 2

- Achieving hospital organizational reform: properly sized and managed hospitals in self-sufficient governorates with equity in usage
- Rural populations served locally for only those services requiring convenience of a nearby facility (55 percent)
- Utilization norms of 350 days in both urban and rural
- Self-sufficient governorates (no leakage or migration across governorates)
- Occupancy norms of 0.6 for rural and 0.7 for urban

Scenario 3

- Achieving care model reform success
- Achieving organizational reforms (Scenario 2)
- Achieving improved utilization of hospital services through better primary care and more efficient lengths of stay (25 percent saving)
- Improving birthing behavior for in-hospital births (90 percent in urban, 50 percent in rural).

Scenario 1 is a set of assumptions that suggest some significant movement toward equity and efficiency in the hospital sector. Scenario 2 offers a more direct attempt to measure bed needs according to the objectives of equity, efficiency, and rationalization of the hospital system. Scenario 3 represents several policy objectives that are of importance in determining bed needs, but that depend on policy interventions beyond hospital bed rationalization.

The rationalization plan will ultimately use the bed needs from Scenario 2 as the representation of the assumptions that best characterize objectives about bed needs, and best serves to guide bed supply rationalization.

4.1.4 Bed Supply Data

Counts of hospital beds for 1998 are taken from secondary sources within the MOHP National Information Center for Health and Population. These counts include every bed licensed to the facility, whether the bed is in service or not. Beds in rural health groups are included in the supply as are beds in specialty hospitals of all types. Bassinets (incubators), ICU beds, and observational beds in outpatient and emergency rooms are excluded.

4.1.5 Population and Forecasts

Population counts for 1996 and rates of increase are taken from data supplied by the CAPMAS. The urban and rural segments of each governorate are defined by CAPMAS, and include centers (rural) or segments (urban). These are further divided into *shiakhas*. This classification differs from the one used by the MOHP, which divides the governorate into health districts that serve a number of towns, cities, and villages. The team sought population data from the Ministry of Rural Development (the former Ministry of Local Government) but no data was available for urban and rural parts of the governorate. Even if data had been available, there would still be a problem to know the centers or segments that each health district serves. Planners concluded there was no way to map population data to bed supply data because of this discrepancy in the way the governorates are classified. The MOHP could not provide information to the plan developers about the number of population that each health district serves.

The population forecasts are computed using the 1996 figures and estimates of the natural rate of increase in population estimated for each governorate by PHR staff.

4.2 Norms and the Process of Creating Them

The estimates of norms (from which the bed needs are computed) are taken from judgments about the objectives of curative care policy. These norms are required for the terms in the bed need equation (1).

The process of creating and verifying these judgments took five steps:

1. Preparation of data on actual values of norm parameters from Egyptian data (by expert consultant)

2. Selection of tentative norms based on these data (by expert consultant)

3. Review and revision of tentative norms with panel of hospital managers and data experts (Panel 1)

4. Review and comment on revised norm values by policy officials (Panel 2)

5. Revision of norms based upon suggestions for examination of additional data sources

A compendium of Egyptian data from varied sources was compiled and analyzed. This compendium used data from:

- DDM household survey (1994-95)-n=50,000

- Special computerization of a sample of hospital admissions in Alexandria (n=18,000)
- MOHP/curative hospital data
- NICHP data
- CAPMAS population data
- DDM costing data on frequency of diagnosis in several hospitals

Two panels were held to judge, verify, and critique the initial suggestions for norms. The first panel, a group of hospital administrators and data experts,[2] met in Alexandria on 9-10 December 1998. This group reviewed the compendium of data, and for each of the model parameters made consensus judgments about norms for the model.

The second panel of policy officials[3] was held 15 December in Cairo. This panel reviewed the results of the first panel and made suggestions about how to modify norms, how to gather additional useful information to verify norms, and how to modify the scenarios.

Comments of this second panel focused on the norm for allocating rural population services to rural and urban facilities. Some members were also concerned about the (lack of) scientific basis for some of the norms. The standards from which "bed need adequacy" are derived are, of course, inherently arbitrary and judgmental. This is not a problem, but rather a necessary part of all planning, where judgments and vision about goals are critical ingredients in setting the course of the plan and related policy. Here, the goals of adequacy are based on standards that represent policy and technical judgments about what constitutes affordable practice patterns, good management practices, preferred care seeking behavior, and other norms. For example, how many admissions and days will be required to provide proper care for a population? What is a reasonable occupancy standard for a facility? What is the useful life of a facility? The judgments about adequacy also critically depend upon assumptions about the effects of important aspects of medical manpower policy, birthing patterns in hospitals, and assumptions about the self-sufficiency of hospital care in each governorate.

The standards have been derived from a combination of Egyptian data and judgment. They have been verified by discussion with hospital directors, Egyptian data and research experts, and others. While it is possible and important to refine these standards through better data, consensus development methods using informed experts, and analytic methods, it should be recognized that such standards can not be deducted from or inferred from scientifically collected data. How would one ever reach a purely scientific conclusion about what level of occupancy to expect from an appropriately sized and well-managed facility? How would science say how much care is needed in a

[2] The first panel was composed of Drs. Khalil Mersal, Mahmoud El Damaty, Azziza Allam, and Magdi Sharaf. Dr. Sonia Hana also contributed in verification in a separate meeting. Other invitees who were not able to attend were: Dr. Maher Abdel Gawad, MOHP Curative Care department, Dr. Sayed Hamoud, director, MOHP Rural Health department, Dr. Said Abdel Ghany, director of Student HIO Hospital, Alexandria, and Dr. Abdel Nasser Amad and Dr. Emad Ezzat of the TSO.

[3] The second panel included Dr. Ahmad Adel, undersecretary for curative care, Dr. Mohamed Monir, Dr. Medhat Abdel Fadil, Dr. Soheir Abdel Moneim, (Curative Care department), Dr. Hassan Abdel Fattah, HIO chairman, Dr. Tayseer El Sawy director of the MOHP Health Information Center, Dr. Mahdeya Mahmoud, director of MOHP Planning department, Alexandria directorate, as well as Dr. Mahmoud Abdel Latif, TSO. Other invitees who were not able to attend this panel were Dr. Ibrahim Saleh, director of MOHP Planning department, Dr. Wagida Anwar, TSO director, MOHP, Dr. Reda Mostafa, director of teaching hospitals organization, deputy director of the Curative Care Organization, Dr. Emad Ezzat, and Dr. Abdel Nasser Ahmad (TSO).

population? Certainly some science and data is essential to understanding the scope of these issues, and the approximate order of magnitude of the standard. But, in the end, the selection of standards on which to base bed needs will need judgment and expert opinion about what constitutes “adequate” performance. Such vision is essential for setting plans.

The methods discussion below describes the methods of setting standards and for verifying them with Egyptian experts.

5. Specific Norms and Standards and Related Data Sources

The specific norms that are used in estimating bed needs or constructing scenarios are shown on the accompanying summary table, which compares them, as possible, with observed data.

Table 3: **Norms Used in the Bed Needs Scenarios**

Parameter	Norm	Current
1. Practice pattern norm	350 bed days/1,000	270 bed/1,000 (340 urban, 210 rural)
2. % of births taken place in hospitals	90% in urban and 50% in rural	12%
3. % of urgent care that needs a near facility	42-66%	42-66%
4. Occupancy norm	60-70%	40%
5. Physician requirement/bed	0.3-0.4/bed	1/bed
6. Intergovernorate leakage	80-133%	Not Known
7. Facility useful life	10-20%	Not Known

5.1 Process Used to Construct Each Norm

The following paragraphs describe the data and process used to construct each. There are four types of norms, or model parameters:

1. ***Utilization and care seeking behavior norms***: These volume-of-care norms relate to parameters that are largely determined by the way consumers choose to seek care (or not) and the related volume of service. In Egypt, self-referral for all medical services is rampant.

2. ***Practice pattern norms:*** These norms refer to the way in which care volumes are allocated to local facilities, other facilities within the governorate, and cross-governorate migration or referrals. These norms are the object of some policy thinking about how to best organize and rationalize the health system for curative care.

3. ***Operational efficiency norms***: Matters of concern and control of hospital managers are capacity utilization (occupancy rate) and useful life of facilities.

4. ***Policy Objectives:*** several major drivers of hospital needs are the percentage of births in hospitals, the availability of physicians (in rural areas), the levels of service quality in hospitals, and the penetration of primary care.

5.1.1 Utilization of Hospital Services

Developers of this bed rationalization plan examined admission rate, bed days, and length of stay data from MOHP hospitals and from the DDM household survey. This resulted in several conclusions (some of which were shown in Table 2):

- Significant gaps exist in utilization (days and admissions).

- These gaps suggest the presence of barriers that limit utilization, such as income (poor consume less) and distance (rural populations consume less).

Opinion data from the DDM survey confirm that economic barriers are the dominant reason persons refrain from using hospitals when potential need arises. (Fifty-two percent of persons declaring an unmet need for service say that this resulted from the hospital care costing too much.) This probably means that cost sharing rates for physician or hospital services in their facilities are too high and that drugs and other supplies may cost too much.

- An implication of the very low use rates among the rural poor is that average severity of admitted cases might be quite high.

- This implies that there is certainly some unmet need for care, especially among the rural poor, the uninsured, and other economically stressed groups. Average lengths of stay are in the range of 10 days throughout most segments of users, though average length of stay for deliveries (about 12 percent of admissions) is only about 1.2 days.

Utilization norms in the form of days of care per capita are used to estimate bed needs. The norms are taken from the DDM survey and represent the average utilization per capita for persons in the top two annual income quintiles (above 1,114 LE), which is about 350 days of care per 1,000 persons. The norm for rural areas in the least ambitious scenario (Scenario 1) is reduced to 250 days of care per 1,000, still above the observed rate of 210 days per 1,000 in these places.

5.1.2 Birthing in Hospitals

The DDM household survey reports a very low in-hospital birth frequency of only about 12 percent. (The average admission rate for deliveries suggests about 210,000 births in hospitals, only 12-13 percent of the 1,662,000 annual births estimated on the basis of fertility rates.) The expert panel suggested that the in-hospital birthing rate was considerably higher in places like Alexandria, possibly around 70 percent, though it is difficult to measure since stillborn outside of hospitals are frequently not reported. The panel suggested that norms for birthing rates in hospitals should be around 90 percent in urban areas and around 50 percent in rural areas.

These norms are used only in computing Scenario 3, since policy interventions that will permit this level of improved health system performance are not easy to effect, and will require significant integration across sectors in the MOHP.

5.1.3 Occupancy Rates

Occupancy rates in MOHP facilities are very low, as Table 4 shows. The HIO reports occupancy of all its beds as 55-56 percent (about 66 percent if only usable beds are used as a denominator). Occupancy rates are not available for other facilities, though they are anecdotally reported to be somewhat better than those of the MOHP.

Table 4: **Occupancy Rates for MOHP Beds, 1996**

Governorate	Occupancy	Governorate	Occupancy
ALEXANDRIA	57.19%	ISMAELIA	40.31%
ASWAN	32.57%	KAFR EL-SHEIKH	33.79%
ASYOUT	54.13%	KALIUBIA	34.41%
BANI SWEIF	40.67%	KENA	32.47%
CAIRO	46.19%	LUXOR	62.75%
DAKAHLIA	42.00%	MATROOH	23.90%
DOMYAT	34.81%	NORTH SINAI	12.52%
EL-BEHERA	44.03%	PORT SAID	46.90%
EL-GHARBIA	45.75%	RED SEA	21.59%
EL-MENIA	42.01%	SHARKIA	45.04%
EL-MONOUFIA	39.24%	SOHAAG	40.30%
EL-WADY EL-GADEID	33.89%	SOUTH SINAI	22.00%
FAYUM	41.71%	SUEZ	31.25%
GIZA	54.23%	Total	39.00%

The occupancy norms are very crucial in the bed need formula, since twice as many beds will be required at 80 percent occupancy as of 40 percent occupancy. The expert panel suggested that occupancy rates for a properly sized and well-managed general hospital facility should be in the 60-80 percent range. Some specialty hospitals may be higher (as for psychiatric) or lower (as for obstetrics) according to rates of patient turnover (higher turnover and lower occupancy) or to maintain epidemic capacity (fever, chest, etc.). Occupancy rate norms are reported to be much lower in rural areas. For this reason, norms for the model are 10 percentage points lower in rural facilities for each of the two scenarios. In Scenario 1 the urban and rural norms are 60 percent and 50 percent respectively. The second scenario, in which use rates are higher in rural areas and governorates are presumed to be self-sufficient, sets norms higher at 70 percent and 60 percent respectively.

5.1.4 Intergovernorate Migration and Referral

Today, patients go to Cairo, Alexandria, and other cities to get hospital care in university and other hospitals. The actual volumes of such care are not known. Setting norms for bed needs in these places requires consideration of this practice.

Is this a preferred type of practice pattern for Egypt? Should Cairo's health system be big enough to accommodate residents of Giza and other places who may travel to Cairo to seek care? There are two answers to this question, each reflected in the two scenarios. Scenario 2 assumes that each governorate is fully self-sufficient, its bed needs consistent with only its own population. Responding to the situation posed above, Scenario 2 sizes the bed needs of Cairo to be consistent with only the population of Cairo.

Scenario 1 assumes that many people continue to be drawn to the major cities for hospital care. The DDM survey contains such data, though the sample size for admitted patients in each governorate is quite small and therefore is not likely to be reliable.

This rationalization plan developed cross-governorate adjustment factors: that is, adjustments to actual population to achieve estimated effective population for computing bed needs for hospitals within each governorate. The approach was first to classify governorates into four groups:

1. Governorates with heavy incoming patient flows (Alexandria and Cairo)

2. Governorates with university hospitals and significant reputations as specialty centers, sufficient to attract many incoming patients from other governorates

3. Governorates that have no university hospital and are likely to have many residents who leave for care in other governorates

4. Other governorates

Populations in these governorates were then adjusted up or down by a "factor" in order to create an estimate of the "effective population" that is treated by the governorate's hospitals. Governorates in each of the four categories were first assigned identical population adjustment factors (1.30, 1.10, 0.9, 1.0 respectively). The factors work in the following way: A governorate assigned a factor of 1.10 is assumed to attract more patients from other governorates than are lost to even the large urban centers. The "net" of these patient flows is +10 percent (e.g. 1.10) . This means that the hospital bed needs in this governorate must support an "effective population" that is 10 percent larger than its actual population. Places with adjustment factors of 0.9 are presumed to need hospital beds sufficient to treat a population that is only 90 percent of the size of the actual population.

The adjustment factors were examined for each governorate and refined based on expert opinion. The resulting intergovernorate flow factors were verified as reasonable by the director of the MOHP Curative Care department, and were shown to the second panel, which made no comment or refinement. The resulting factors are reported in Table 5.

5.1.5 Convenience Norms for Specifying Requirements for Local Care

The norms for care migration patterns between urban and rural areas within governorates are also critical to understanding where beds are needed. If more care is to be provided locally in rural areas, then fewer beds will be needed in the cities. If only minimal care is required locally, then more can be referred to cities. A norm is needed to define the percentage of all care requirements that should be provided locally to rural populations, and the percentage that should be provided elsewhere in the governorate. This is actually a very important policy issue about the function of rural, district, and urban facilities. For this reason the plan considers two different norms (Scenarios 1 and 2) about how the care for rural populations is to be provided.

Table 5: Cross Governorate Adjustment Factors

Governorate	Total Population	Population Adjustment Factor	Effective Population
ALEXANDRIA	3,328,196	1.25	4,160,245
ASWAN	973,671	0.90	876,304
ASYOUT	2,802,185	1.00	2,802,185
BANI SWEIF	1,860,180	0.80	1,488,144
CAIRO	6,789,479	1.32	8,962,112
DAKAHLIA	4,223,655	1.10	4,646,021
DOMYAT	914,614	0.90	823,153
EL-BEHERA	3,981,209	0.90	3,583,088
EL-GHARBIA	3,404,827	0.90	3,064,344
EL-MENIA	3,308,875	0.90	2,977,988
EL-MONOUFIA	2,758,499	0.90	2,482,649
EL-WADY EL-GADEID	141,737	0.90	127,563
FAYUM	1,989,881	0.81	1,611,804
GIZA	4,779,865	0.90	4,301,879
ISMAELIA	715,009	1.00	715,009
KAFR EL-SHEIKH	2,222,920	0.90	2,000,628
KALIUBIA	3,302,860	0.90	2,972,574
KENA	2,441,420	0.91	2,221,692
LUXOR	360,503	0.91	328,058
MATROOH	211,866	0.90	190,679
NORTH SINAI	252,750	0.89	224,948
PORT SAID	469,533	1.00	469,533
RED SEA	155,695	0.89	138,569
SHARKIA	4,287,848	1.05	4,502,240
SOHAAG	3,123,000	1.00	3,123,000
SOUTH SINAI	54,495	0.89	48,501
SUEZ	417,610	1.04	434,314
TOTAL	**59,272,382**		59,277,222

Readers should keep in mind that the definition of a rural area here includes the central town; in other words, it includes rural facilities and the district hospital. So, the norms for care providers must consider both the rural hospitals and other groups, and the adjacent district hospitals.

Also important is to understand the pattern of diagnoses in urban hospitals, and to determine which cases might require convenience (due to urgency or simplicity) and which might not require convenience (and may be referred to hospitals in other locations). This evidence is then taken as a norm for what the requirement for local care should be in Scenario 2 (where high utilization patterns are the norm for rural utilization). In Scenario 1, where lower utilization norms are used, the percentage of care that requires convenience in rural areas is taken to be somewhat higher than the evidence would suggest (since lower utilization may suggest that only the most urgent and serious cases will seek hospital care).

Records of about 18,000 cases were collected from 13 Alexandria hospitals (of all sectors). These cases and their diagnoses were evaluated (see Annex C) and classified as urgent (requiring care

in less than 30 minutes), simple (not life threatening, nor complex; cases in which a person is unlikely to travel for more than 30 minutes), and others. A total of 64 percent of the admissions were judged to need convenience (urgent or simple), representing 42 percent of the patient days.

Following concerns expressed by the second panel about the relevance of Alexandria data for this purpose data on frequency of admission by diagnosis from two other hospitals (Bani Sweif and Dakahlia) were reviewed. They reflected convenience requirements for 56 percent and 60 percent of the days respectively.

The norms selected for the local care requirement parameter in rural populations are 67 percent of the days in Scenario 1 and 55 percent of the days in Scenario 2. Again, these local requirements include the care provided by both local rural facilities and in the adjacent district hospitals. So, by implication, about 33 percent to 45 percent of the hospital care required by rural populations is assumed to be shifted to urban hospitals within the same governorate.

It is possible that these parameters are excessive, and a more ideal facility hierarchy model might show more care being delivered in larger, more centralized specialty or general hospitals. If so, then even lower percentages of care would be retained in local (rural and district) hospitals, and the percentage might be as low as 40-50 percent. If this were to be done, then bed needs would be shifted further away from rural regions, toward urban locations.

5.1.6 Useful Life and Minimum Size of Facilities

Both panels discussed the idea of norms for these aspects of facility planning. For purposes of converting excess beds into “how many bed to close down” or for purposes of converting estimates of shortages into “how many beds to build,” the “useful life” criterion is relevant. Building requirements need to consider the rate of replacement indicated by the useful life of a facility.

Data on useful life were available in the data compendium from the United States (American Hospital Association norms). These data are not directly pertinent, since the quality of materials and construction are different and the physical environment is so different. The panels spoke about useful life from 10 to 40 years.

The rationalization plan considers the useful life of a facility to be 20 years. This means that in every year, 5 percent of the facility capital stock (5 percent of beds) must be replaced.

Larger facilities have two main advantages. First, they can be more economic to operate. Second, they offer a more attractive environment for physicians to practice, learn, teach, etc. On the other hand, larger facilities reduce the accessibility of some patients by causing the average patient to travel farther than would be the case if smaller, more dispersed facilities existed. The panels considered 40 beds to be a reasonable minimum size for facilities.

6. Bed Supply Adequacy in Egypt

6.1 Overall Shortage and Surplus of Beds

Using the model and norms, bed needs in Egypt were calculated and are shown in Table 6. The table shows that total bed need in Egypt in 2003 is estimated to be around 100,000 (103,500 for Scenario 1 and 98,900 for Scenario 2). This bed need level would result in about 1.5 beds per 1000 persons, against a current level of about 2.1 per 1000. It implies that Egypt has an overall surplus of about 25,000 beds (about 25 percent).

Table 6: Summary of Bed Needs

Governorate	Current		Scenario 1			Scenario 2		
	Bed Supply	Beds per 1,000 1996	Bed Needs	Bed Surplus	Bed Needs / Beds	Bed Needs	Bed Surplus	Bed Needs / Beds
Urban	94,426	3.7	69,586	24,840	0.74	64,168	30,258	0.68
Rural	31,295	0.9	33,924	-2,629	1.08	34,756	-3,461	1.11
Total	125,721	2.1	103,509	22,212	0.82	98,923	26,798	0.79

The overall level of hospital bed need is not sensitive to the differences between the two scenarios. While Scenario 1 has more modest rural utilization norms, it also has more modest occupancy norms for both urban and rural areas.

It should be noted that these are overall bed need requirements sized against the population for 2003. They do not measure the number of beds to be added or subtracted from the bed supply in any year. Replacement or renovation investments are an important part of any investment plan, though not directly part of the calculation for the number of beds needed to care for a population. This calculation requires consideration of a formula (Figure 3) for construction needs such as:

Annual Construction Needs = Replacement Needs ± Changes in beds due to Rationalization Policy, or

Figure 3: Equation 2

(2) $ACN = B\left(\frac{1}{UL}\right) \pm V(BN-B)$

Where ACN = Annual construction needs
B = Beds
UL = Useful life of facility
BN = Bed needs (from equation 1)
V = Policy factor for reaching near balance of beds and bed needs

The replacement needs (and renovation) are to be considered together with overall rationalization planning in investment planning. Age of plant would also be an important consideration in any particular year's investment plan. Data was not available on age of plant in the aggregate or by governorate. Other things being the same, the investment requirements for renovation and construction will be higher the shorter the useful life and the older the age of plant.

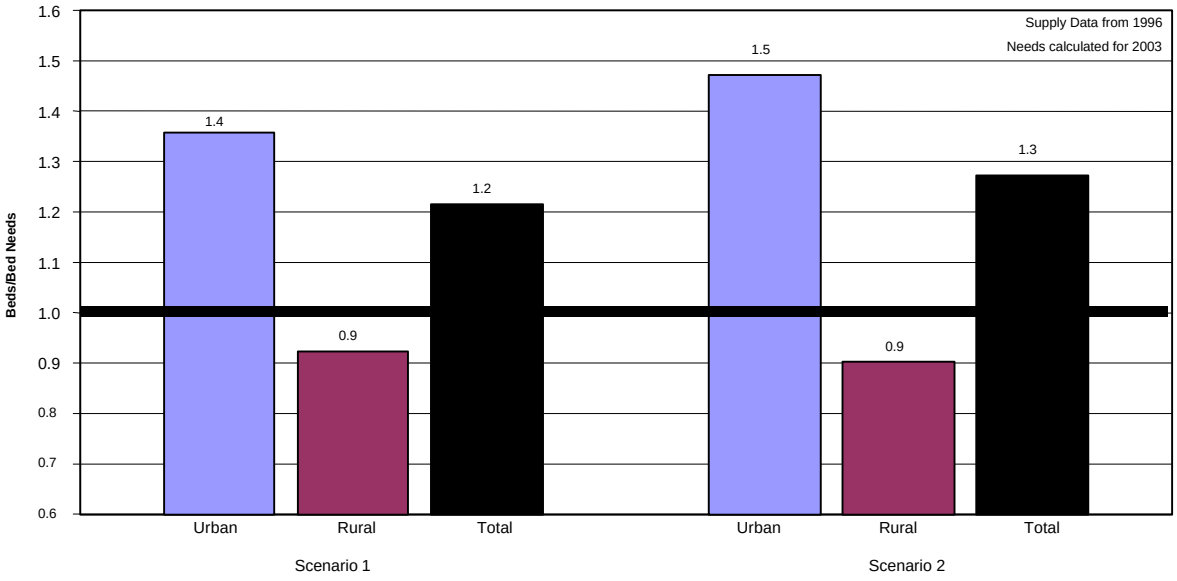
The expert panels put useful life at 20 years. This would mean that in any year about 5,000 newly constructed replacement beds or renovated beds could be justified in an investment plan on the basis of depreciation alone.

6.2 Urban and Rural Bed Supply Adequacy

The situation of overall bed needs and priorities is clearer if the situation of urban and rural beds are examined separately. The aggregate surplus of beds noted above is, in fact, a composite between a large surplus of about 25,000 in urban Egypt and a small shortage of beds in rural Egypt. In urban areas, bed excesses of about 26,000 to 30,000 will exist using the 2003 population projections. This surplus is 25-30 percent of currently available beds.

In rural areas there appears to be a slight shortage of beds of several thousand, approximately 10 percent more than the current supply. Figure 4 illustrates these relationships between bed needs and current supply, by locale and in aggregate.

Figure 4: Ratio of Bed Supply to Bed Needs



6.3 Effects of Other Policies

Although not illustrated here, the effects of other policies on overall levels of bed needs can be computed directly.

For example, if in-hospital birthing norms of 90 percent of urban births and 50 percent of rural births were achieved it would add about 1.0 million births and 1.2 million hospital days to care requirements. This would add 3,000 to 4,000 beds to the rural shortage (making the shortage larger) and lessen the urban surpluses by 2,000 to 3,000 beds.

Length of stay improvements due to better compliance with good primary care practices or service quality improvements in hospitals translate directly into bed need reductions. For example, a 25 percent improvement in length of stay (from an average of about 10 days down to about 7.5 days) would decrease bed needs to the point where the overall surplus would rise from about 25,000 beds to about twice that amount. In rural areas the bed needs would fall about 25,000, creating a surplus of about 20 percent. In urban areas the existing large surplus of beds (25,000 to 30,000) would increase to 32,000 to 36,000 beds, creating a situation where nearly one in two beds would be unnecessary.

7. Distributional Adequacy Across Governorates

Tables 7, 8, and 9 show the bed needs by governorate. As was the case with urban and rural segments, finer and finer breakdowns of the Egyptian geography provide more details about the location of shortages and surpluses of beds. Because the individual scenarios alter assumptions about the flows of patients across geography, the governorate-by-governorate estimates of bed needs show significant changes between scenarios.

A note of caution is required here. As can be seen from the data on beds per capita across governorates presented in the table in Annex A, there is extreme variation across governorates. The estimates of surpluses and shortages by governorate will be highly variable as well. This is because the method of computing bed need is not sensitive to unique local circumstances. In some cases, these local circumstances will be important in deciding bed needs. Special care will need to be taken when implementing the rationalization plan for this reason.

Table 7: **Urban Bed Needs**

Governorate	Current		Scenario 1			Scenario 2		
	Bed Supply 1996	Beds per 1,000 '96	Urban Bed Needs	Bed Surplus (shortage)	Bed Needs	Urban Bed Needs	Bed Surplus (shortage)	Bed Needs
ALEXANDRIA	10,978	3.30	7,308	3,670	0.7	4,991	5987	0.5
ASWAN	1,486	3.57	992	494	0.7	1,043	443	0.7
ASYOUT	3,750	4.91	2,733	1,017	0.7	2,718	1032	0.7
BANI SWEIF	1,433	3.27	1,391	42	1.0	1,755	-322	1.2
CAIRO	30,012	4.42	15,527	14,485	0.5	10,041	19971	0.3
DAKAHLIA	3,494	2.97	4,411	-917	1.3	3,981	-487	1.1
DOMYAT	1,723	6.86	789	934	0.5	871	852	0.5
EL-BEHERA	2,074	2.28	3,230	-1,156	1.6	3,632	-1558	1.8
EL-GHARBIA	5,972	5.65	2,989	2,983	0.5	3,258	2714	0.5
EL-MENYA	2,308	3.59	2,592	-284	1.1	2,960	-652	1.3
EL-MONOFIA	2,177	3.97	2,161	16	1.0	2,462	-285	1.1
EL-WADY EL GADEID	346	5.06	157	189	0.5	163	183	0.5
FAYUM	928	2.08	1,485	-557	1.6	1,858	-930	2.0
GIZA	8,474	3.27	5,699	2,775	0.7	5,822	2652	0.7
ISMAILIA	1,390	4.08	906	484	0.7	846	544	0.6
KAFR EL-SHEIKH	1,388	2.72	1,805	-417	1.3	2,029	-641	1.5
KALIUOBYA	6,762	5.02	3,501	3,261	0.5	3,701	3061	0.5
KENA	1,092	2.11	1,956	-864	1.8	2,191	-1099	2.0
LUXOR	378	1.05	634	-256	1.7	595	-217	1.6
MATROOH	448	3.99	255	193	0.6	261	187	0.6
NORTH SINAI	268	1.80	345	-77	1.3	353	-85	1.3
PORT SAID	1,603	3.41	842	761	0.5	719	884	0.4
RED SEA	232	1.67	304	-72	1.3	295	-63	1.3
SHARKIA	2,744	2.83	4,097	-1,353	1.5	3,955	-1211	1.4
SOHAAG	1,875	2.74	2,854	-979	1.5	2,901	-1026	1.5
SOUTH SINAI	70	2.39	84	-14	1.2	87	-17	1.2
SUEZ	1,021	2.44	829	192	0.8	680	341	0.7
TOTAL	**94,426**	**3.71**	**69,876**	**24,550**	**0.74**	**64,168**	**30,258**	**0.68**

Table 8: Rural Bed Needs

Governorate	Current		Scenario 1			Scenario 2		
	Bed Supply 1996	Beds per 1000 1996	Rural Bed Needs	Bed Surplus (shortage)	Bed Needs	Rural Bed Needs	Bed Surplus (shortage)	Bed Needs
ALEXANDRIA	0	n/a	0	0	n/a	0	0	n/a
ASWAN	797	1.43	525	272	0.7	558	239	0.7
ASYOUT	1,796	0.88	2,208	-412	1.2	2,116	-320	1.2
BANI SWEIF	1,120	0.79	1,241	-121	1.1	1,486	-366	1.3
CAIRO	0	n/a	0	0	n/a	0	0	n/a
DAKAHLIA	3,596	1.18	3,510	86	1.0	3,057	539	0.9
DOMYAT	1,170	1.76	634	536	0.5	675	495	0.6
EL-BEHERA	2,438	0.79	2,932	-494	1.2	3,121	-683	1.3
EL-GHARBIA	1,847	0.79	2,181	-334	1.2	2,322	-475	1.3
EL-MENYA	2,674	1.00	2,581	93	1.0	2,748	-74	1.0
EL-MONOFIA	2,009	0.91	2,125	-116	1.1	2,262	-253	1.1
EL-WADY EL GADEID	344	4.69	71	273	0.2	76	268	0.2
FAYUM	1,062	0.69	1,363	-301	1.3	1,612	-550	1.5
GIZA	1,303	0.60	2,149	-846	1.6	2,288	-985	1.8
ISMAILIA	632	1.69	417	215	0.7	399	233	0.6
KAFR EL-SHEIKH	1,562	0.91	1,636	-74	1.0	1,742	-180	1.1
KALIUOBYA	1,401	0.72	1,961	-560	1.4	2,087	-686	1.5
KENA	1,499	0.78	1,858	-359	1.2	1,956	-457	1.3
LUXOR			0	0	n/a	0	0	n/a
MATROOH	171	1.72	100	71	0.6	106	65	0.6
NORTH SINAI	174	1.68	111	63	0.6	120	54	0.7
PORT SAID	0	n/a	0	0	n/a	0	0	n/a
RED SEA	122	7.12	21	101	0.2	22	100	0.2
SHARKIA	3,270	0.99	3,750	-480	1.1	3,421	-151	1.0
SOHAAG	2,185	0.90	2,660	-475	1.2	2,548	-363	1.2
SOUTH SINAI	123	4.89	32	91	0.3	34	89	0.3
SUEZ	0	n/a	0	0	n/a	0	0	n/a
TOTAL	**31,295**	**0.93**	**34,065**	**-2,770**	**1.1**	**34,756**	**-3,461**	**1.1**

Table 9: Total Bed Needs

Governorate	Current		Scenario 1			Scenario 2		
	Bed Supply 1996	Beds per 1000 1996	Total Bed Needs	Bed Surplus (shortage)	Bed Needs	Total Bed Needs	Bed Surplus (shortage)	Bed Needs
ALEXANDRIA	10,978	3.30	7,308	3,670	0.7	4,991	5,987	0.5
ASWAN	2,283	2.34	1,517	766	0.7	1,601	682	0.7
ASYOUT	5,546	1.98	4,941	605	0.9	4,834	712	0.9
BANI SWEIF	2,553	1.37	2,632	-79	1.0	3,241	-688	1.3
CAIRO	30,012	4.42	15,527	14,485	0.5	10,041	19,971	0.3
DAKAHLIA	7,090	1.68	7,921	-831	1.1	7,037	53	1.0
DOMYAT	2,893	3.16	1,422	1,471	0.5	1,545	1,348	0.5
EL-BEHERA	4,512	1.13	6,162	-1,650	1.4	6,754	-2,242	1.5
ELGHARBIA	7,819	2.30	5,170	2,649	0.7	5,580	2,239	0.7
EL-MENIA	4,982	1.51	5,174	-192	1.0	5,707	-725	1.1
EL-MONOFIA	4,186	1.52	4,286	-100	1.0	4,724	-538	1.1
EL-WADY EL GADEID	690	4.87	228	462	0.3	238	452	0.3
FAYUM	1,990	1.00	2,848	-858	1.4	3,470	-1,480	1.7
GIZA	9,777	2.05	7,848	1,929	0.8	8,110	1,667	0.8
ISMAILIA	2,022	2.83	1,323	699	0.7	1,245	777	0.6
KAFR EL-SHEIKH	2,950	1.33	3,441	-491	1.2	3,771	-821	1.3
KALIUOBYA	8,163	2.47	5,461	2,702	0.7	5,787	2,376	0.7
KENA	2,591	1.06	3,814	-1,223	1.5	4,148	-1,557	1.6
LUXOR	378	1.05	634	-256	1.7	595	-217	1.6
MATROOH	619	2.92	355	264	0.6	367	252	0.6
NORTH SINAI	442	1.75	457	-15	1.0	473	-31	1.1
PORT SAID	1,603	3.41	842	761	0.5	719	884	0.4
RED SEA	354	2.27	324	30	0.9	318	36	0.9
SHARKIA	6,014	1.40	7,847	-1,833	1.3	7,376	-1,362	1.2
SOHAAG	4,060	1.30	5,514	-1,454	1.4	5,449	-1,389	1.3
SOUTH SINAI	193	3.54	116	77	0.6	121	72	0.6
SUEZ	1,021	2.44	829	192	0.8	680	341	0.7
TOTAL	**125,721**	**2.12**	**103,941**	**21,780**	**0.8**	**98,923**	**26,798**	**0.8**

Scenario 1. This scenario (refer to scenario parameters enumerated in section 4.1.3) makes few substantial changes in geographic patters of referral/migration but does impose more equity in usage across governorates and much improved capacity utilization in facilities. In it, rural bed needs show a slight (10 percent) shortage, against a large (26 percent) urban hospital surplus, for a total of 22,000 surplus of beds. Twelve rural governorates, showing shortages of less than 1,000 beds each, drive the overall rural shortage. But there are also 10 rural portions of governorates with small surpluses as well.

Urban portions of governorates also have shortages in beds in 12 cases. But, six governorates with extremely large surpluses overwhelmingly mask these instances of shortage. Cairo, of course, is the most overbedded place in Egypt (even under the favorable cross-governorate migration norms of Scenario 1): the number of beds here is about twice as many as required.

Scenario 2. This scenario represents a more ideal set of norms in terms of meeting the objectives for the rationalization plan set out in chapter 3. Bed needs assume that usage rates are equalized across Egypt, and that preferred occupancy rates are used as well. This scenario also makes a number of differing assumptions about geographic migration for care that will have substantial effects on rural bed needs. Hospital hierarchical organization is assumed to be more rational than is evident now, or in Scenario 1. Here, the computations of bed needs assume that each governorate is self-sufficient and assumes higher referral/migration rates from rural areas to urban locations within the same governorate. This model of organization assumes some hub-spoke arrangement between urban hospitals and districts, and between districts and the more rural facilities. At the same time, rural areas (including district hospitals) are asked to service higher usage norms for their residents.

Overall, bed needs are only slightly higher in rural areas under this model of care, though urban bed needs fall by more than 7 percent, creating an overall surplus in urban areas of about 30,000 beds for 2003 (with urban bed needs being only about two-thirds of existing beds).

There are some substantial changes in the bed needs for some governorates under this scenario relative to the first scenario. The assumption about governorate self-sufficiency has dramatic effects on bed needs in Cairo and Alexandria, where surpluses will increase to very high levels. Other governorates also suffer lower requirements in this scenario as well, but less so (Suez, Port Said, Dakahlia). Some governorates, which previously exported patients to more urban governorates, are showing higher bed needs under Scenario 2 assumptions (Monofia, Fayum, Bani Sweif).

7.1 Geographic Priorities

This section of the plan draws some policy implications regarding bed needs and investments in facilities. This discussion focuses on Scenario 2, though findings are approximately the same for both scenarios.

Tables 10 and 11 summarize the situation of bed supply and rationalization in Egypt from the analyses reflected in the tables above. These tables attempt to understand the importance of surplus and shortage as they persist side-by-side in Egypt, and they apply a criterion for policy action. If beds are within ±15 percent (table 10), or ± 10 percent (Table 11) of bed needs, the situation is considered to be "near balance." The tables identify excesses and shortages outside "near balance," along with the size of the affected population.

Table 10: **Bed Supply When Near Balance Is ± 15% of Bed Needs**

	Scenario 1			Scenario 2		
	Urban	**Rural**	**Total**	**Urban**	**Rural**	**Total**
A. Bed Shortage						
Areas in gov's with beds available < 85% beds needed	11	8	7	12	9	8
Percentage of national population	10%	30%	31%	10%	32%	35%
No. of beds to be added	6,574	3,710	7,640	7,822	4,885	9,756
B. Near Balance						
Areas in gov's. within 85 to 115% of beds needed	3	6	7	2	5	6
Percentage of national population	3%	3%	26%	3%	32%	23%
C. Bed Excess						
Areas in gov's. with beds available >115% beds needed	13	8	13	13	8	13
Percentage of national population	29%	3%	42%	29%	3%	42%
No. of beds to be reduced	31,615	1,631	30,326	38,851	1,543	37,046

Table 11: Bed Supply When Near Balance Is ±10% of Bed Needs

	Scenario 1			Scenario 2		
	Urban	**Rural**	**Total**	**Urban**	**Rural**	**Total**
A. Bed Shortage						
Areas in gov's with Beds Available < 90% beds needed	12	10	8	14	11	10
Percent of national population	11%	38%	38%	13%	39%	45%
No. of beds to be added	6,946	4,382	8,596	8,593	5,318	11,019
B. Near Balance						
Areas in gov's within 90-110% of beds needed	2	4	5	0	2	2
Percentage of national population	2%	3%	14%	0%	39%	8%
C. Bed Excess						
Areas in gov's with beds available >110% beds needed	13	8	14	13	9	15
Percentage of national population	29%	3%	47%	29%	8%	48%
No. of beds to be reduced	31,438	1,624	30,732	38,851	2,082	37,795

Scenario 2 in Table 10 shows that only two governorates have bed needs in approximate balance with supply. Despite their "urban" status, those governorates are small, with only 3 percent of the Egyptian population. Twelve governorates have urban areas that have bed shortages (e.g. beds< .85 bed needs); they represent only 10 percent of the entire population and require a total of 7,822 new beds to bring these areas up to the near balance standard (e.g., up to at least 85 percent of needed beds). The key findings from this table are:

- Surplus beds is surely an urban problem, but not exclusively. Shortage is primarily a rural problem, but not exclusively.

- There are large numbers of places with mismatches between supply and bed needs. About the same number of persons live in governorates with surpluses (42 percent) as in places with shortages (35 percent).

- About one-third of the Egyptian population lives in rural places in near balance. While more than half of the population is rural, only about 3 percent of the population lives in rural places with surpluses of beds.

- Relieving the "mismatch" problem in full would require construction of 12,707 beds (7,822 + 4,885), mostly in urban areas, and elimination of 40,494 beds (38,851 + 1,543), again mostly in urban areas.

Table 12 shows the governorates, characterizing their urban and rural components according to the "near balance" criterion. It shows Dakahlia and Monofia being in near balance (possibly Bani Sweif as well under Scenario 1). Several governorates have shortages for both urban and rural places (El Behera, Kena, Fayum, Sohaag) and others are clearly in surplus of beds for both types of regions (Aswan, Domyat, El-Wady El Gadeid, Ismalia, Matrooh). Several governorates have potential for shifting beds from areas of surplus to areas of shortage.

Table 12: Scenario 1: Bed Needs by Urban and Rural Areas within Governorates

	Urban Excess	Urban Balance*	Urban Shortage
Rural Excess	ASWAN DOMYAT EL-WADY EL-GADEID ISMAILIA MATROOH		NORTH SINAI RED SEA SOUTH SINAI
Rural Balance*		EL-MONOFIA EL-MENYA BANI SWEIF	SHARKIA KAFR El SHEIKH DAKAHLIA
Rural Shortage	ASYOUT EL-GHARBIA KALIUOBYA GIZA		EL-BEHERA KENA FAYUM SOHAAG
No Rural	ALEXANDRIA CAIRO PORT SAID SUEZ		LUXOR

*Near Balance: Bed supply that falls between 0.85-1.15 of bed needs.

Table 13: **Scenario 2: Bed Needs by Urban and Rural Areas within Governorates**

	Urban Excess	Urban Balance*	Urban Shortage
Rural Excess	ASWAN DOMYAT EL-WADYEL-GADEID ISMAILIA MATROOH		NORTH SINAI RED SEA SOUTH SINAI
Rural Balance*		DAKAHLIA EL-MONOFIA	EL-MENYA KAFR EL-SHEIKH SHARKIA
Rural Shortage	ASYOUT EL-GHARBIA KALIUOBYA GIZA		EL-BEHERA KENA FAYUM SOHAAG BANI SWEIF
No Rural	ALEXANDRIA CAIRO PORT SAID SUEZ		LUXOR

*Near Balance: Bed supply that falls between 0.85-1.15 of bed needs.

Based upon Table 12 and the tables of data presented earlier, it is possible to identify priority sites for action—either increasing or decreasing bed numbers—and the approximate numbers of beds needed in each category to bring the level of supply into near balance with Scenario 2 standard of bed need. Several governorates are in the interesting position of needing to solve significant and opposite types of mismatch problems; two of them are listed in Table 18.

Table 14: Priorities for Increasing Beds in Urban Areas of Governorates

Governorate	Bed Need	Beds Needs: Bed Supply
1.Kena	779	2
2.Fayum	653	2
3.El Behera	1017	1.8
4.Luxor	130	2

Table 15: Priorities for Increasing Beds in Rural Areas of Governorates

Governorate	Bed Need	Beds Needs: Bed Supply
1.Giza	643	1.8
2.Fayum	279	1.5
3.El Behera	105	1.3
4.Kena	165	1.3

Table 16: Priorities for Reducing Beds in Urban Area

Governorate	Bed Need	Beds Needs: Bed Supply
1.Cairo	18,470	0.3
2.Port Said	877	0.4
3.Alexandria	5,227	0.5
4.Domyat	722	0.5
5.Ismailia	590	0.6
6.Aswan	442	0.7
7.Asyout	627	0.7

Table 17: Priorities for Reducing Beds in Rural Areas of Governorates

Governorate	Bed Need	Beds Needs: Bed Supply
1.Domyat	365	0.6
2.Aswan	156	0.7
3.Ismailia	173	0.6

Table 18: **Priorities for Reallocations and Other Changes within Governorate**

Governorate	Priorities for Reallocation
1. Kaliuobya	Needs to reduce urban by 2,526 and build 574
2.El Gharbia	Needs to reduce urban by 2,225 and build 77

The reductions are stated quite conservatively. Population is credited to be 2003 rather than current, probably increasing required beds by 10 percent to 15 percent over current levels. Second, the target reduction is given by the number of beds required to be in near balance (e.g., 115 percent of the desired level).

Scenario 1 priorities would be nearly the same, though the size of reductions in urban areas would be smaller, particularly in Cairo (by 5,400) and in Alexandria (by 2100).

In summary, the priorities for rationalization call for new bed construction in some areas, and bed reductions in others. The general nature and order of magnitude of these changes is not sensitive to the choice between the two scenarios presented. Overall, this plan is moving Egypt toward a bed per capita standard in the 1.4 to 1.6 range, down from 2.1 today, while equalizing utilization (at a higher level), improving capacity utilization, and rationalizing the flow of patients across geography for care.

Replacement and renovation needs are not explicitly part of these priorities. Equation (2) above shows that replacement needs in any year are related to assumptions about useful life. If 20 years is used as the norm for this, then in any year we can assume that about 5 percent of the needed facility beds will need to be rebuilt. This is a total of about 5,000 beds a year.

It should also be kept in mind that these numerical values are not as precise as they appear. The estimates of needs for each of the governorates is necessarily imprecise, since it makes absolutely no adjustment for local factors other than population. Peculiarities of geography, isolation, epidemiology, and culture can cause important variations in ideal patterns of usage, and in patterns of facility planning to meet those needs. For this reason, the specific plans of governorates for investments must be evaluated in depth, as must specific projects. For this reason too, this model of bed needs should continue to be refined to accept more detailed geographic unit of analysis, and to be considerate of more local factors, such as travel time. Some of these issues are discussed below in the part of the rationalization plan dealing with implementation concerns.

8. Implementation Issues

Three issues need to be discussed with respect to implementation of this plan for rationalizing hospital beds. The issues concern the workability of policy instruments for achieving this plan and the necessary accommodations that may need to accompany the plan.

8.1 Rural Availability of Physicians

It is not possible to fully achieve rural targets for inpatient usage by simply constructing beds to meet the formula. There are two main reasons why the plan is not ready for implementation. First, in many regions of Egypt hospital utilization is below norms because of the lack of physicians practicing in those locations. The rationalization plan presumes that utilization volumes can be increased in these locations to achieve some sense of equality with urban persons, and those with ability to pay. This is probably not possible at this time due to the reported physician shortages in many rural areas.

Second, it is not possible to identify rural locations that have no inpatient facilities, because such data is not available at this time. It is impossible to say what volumes of local rural populations are without local service, an important aspect of assessing the overall building needs for a rural rationalization program.

Consequently, the rural rationalization program sketched numerically in this paper, may understate the true building needs of isolated (but masked) populations without service. And the simple act of building the beds in the proper locations would not likely create the desired access to services, since there is not an adequate number of physicians in place to serve these locations.

Implementation in rural areas should be held until a proper, integrated strategy for rural health services is developed. *This strategy would have components such as*:

- Identifying for all rural communities the nearest hospital with doctors, and enumeration of all communities without hospital services.
- Identifying policy instruments for attracting physicians (and other professionals) to rural locations, including:
  - Moving medical education to the community
  - Consolidating services into larger, multi-village facilities
  - Using catchment area budgeting for district in a way that provides financial incentives for creating care systems
  - Establishing family medicine clinics with observation beds
  - Expanding the roles of nurses
  - Bringing professional health services to populations where physicians will never be able to be retained, and using observation beds, expanded roles, and referrals

- Better elaborate the role of district and rural facilities and the strategy for effecting specialization in their activities and the mechanisms for achieving a preferred care pattern

This strategy should take four to six months to prepare, and would be the basis for proceeding with the rationalization plan for rural facilities, or some variant of that plan that is consistent with the rural health strategy.

8.2 Implementation Tactics

The implementation of this rationalization plan may be in several forms. These are not alternatives, but may be taken together.

National annual quantitative benchmarks: such as achieving an urban bed target of removing 25 percent of the excess beds, or 7,500 beds.

Rules or criteria against which governorates can plan: such as requiring the governorates to consider the total bed needs as a target, and to propose annual investment plans for achieving some target of progress toward that plan, such as achieving 50 percent of the bed need near balance target in the next 5 years.

Specific governorate benchmarks: The governorates noted earlier that shortages or surpluses for the entire governorate could be assigned a benchmark or target for each year by the MOHP.

Specific project approval rules and criteria: such as the following

- Evidence that the project moves the governorate toward balance
- Evidence that there are sufficient physicians and other manpower to staff the beds (0.3-0.4 physicians/bed)
- Evidence that hospital needs are presently unmet (no excess hospital capacity within 10 km or evidence that utilization rates in the community are lower than other nearby populations)

8.3 Using Financial Incentives to Achieve Rationalization

Budgeting/financial incentives for hospital managers or managers of district areas can be a very strong incentive to help rationalize hospital bed supply. Their use should be considered. Existing incentives encourage facility managers to have as many beds as they can. This could be changed. For example, if they were given fixed budgets based upon patient volume, or fixed amounts per patient treated this would reform their thinking about how many beds were required. In the research about the effectiveness of health reforms, these approaches to hospital payment have been shown to be more effective in bed rationalization than mandated rules about number of needed beds.

Annex A: Number of Beds by Sector

Annex Table 1: Number of Beds by Sector (as of January 1, 1998)

Governorate	Total Beds	MOHP	Other Ministries	Teaching Hospitals	Public Sector	Private Sector	% Beds without Fee	Beds Per Capita (per 1000)
ALEXANDRIA	10,978	38%	26%	0%	23%	14%	56%	3.3
ASWAN	2,283	82%	0%	0%	0%	17%	72%	2.3
ASYOUT	5,546	56%	27%	0%	6%	11%	81%	2.0
BANI SWEIF	2,553	92%	0%	0%	3%	5%	87%	1.4
CAIRO	30,012	30%	26%	7%	19%	19%	61%	4.4
DAKAHLIA	7,090	71%	22%	0%	3%	5%	96%	1.7
DOMYAT	2,893	68%	0%	0%	24%	8%	81%	3.2
EL-BEHERA	4,512	71%	0%	19%	4%	5%	79%	1.1
EL-GHARBIA	7,819	56%	17%	0%	15%	13%	67%	2.3
EL-MENYA	4,982	80%	9%	0%	4%	6%	80%	1.5
EL-MONOFIA	4,186	67%	10%	17%	2%	4%	73%	1.5
EL-WADY EL-GADEID	690	94%	6%	0%	0%	0%	88%	4.9
FAYOUM	1,990	95%	2%	0%	3%	1%	72%	1.0
GIZA	9,777	50%	6%	6%	5%	32%	50%	2.0
ISMAILIA	2,022	57%	25%	0%	11%	7%	66%	2.8
KAFR El-SHEIKH	2,950	85%	0%	0%	14%	1%	81%	1.3
KALIUOBYA	8,163	68%	12%	6%	10%	4%	80%	2.5
KENA	2,591	94%	1%	0%	5%	1%	84%	1.1
LUXOR	378	95%	0%	0%	0%	0%	91%	1.0
MATROOH	619	86%	0%	0%	0%	14%	88%	2.9
NORTH SINAI	442	100%	0%	0%	0%	0%	88%	1.7
PORT SAID	1,603	74%	1%	0%	21%	5%	71%	3.4
RED SEA	354	82%	0%	0%	11%	7%	89%	2.3
SHARKIA	6,014	70%	20%	0%	5%	6%	86%	1.4
SOHAAG	4,060	84%	0%	8%	3%	6%	91%	1.3
SOUTH SINAI	193	100%	0%	0%	0%	0%	88%	3.5
SUEZ	1,021	74%	0%	0%	6%	21%	64%	2.4
TOTAL	**125,721**	**58%**	**15%**	**4%**	**11%**	**12%**	**72%**	**2.1**

Annex B: MOHP Bed Needs

Calculations were done for MOHP bed needs. As discussed in the text, this calculation is problematic since there is not a designated MOHP population from which to compute bed needs. A bed need estimate was prepared by applying a "share percent" for MOHP to the total urban and rural requirements. This bed need requirement can then be compared against the MOHP bed supply. The tables report this result for each of the two scenarios.

The MOHP share assumption differs under the two scenarios. Under Scenario 1 the MOHP share is taken to be the current average share of bed days, as measured by the DDM survey. The urban share is 44 percent of the bed days. The rural share is 64 percent of the bed days for this population.

For Scenario 2 the share is assumed to be different. Since governorates are presumed to be self-sufficient and since MOHP is the only payer operating facilities in rural areas we have assumed that the MOHP share is 100 percent in rural populations.

The MOHP bed needs shown in the attached table are still considered to be very tentative. The variations in non MOHP facility availability in urban places, for example, can create big and artificial mismatches between supply and bed need since the bed need formula uses only the national urban average bed day share of MOHP. For this reason the implication of the MOHP share estimates of shortage and surplus are less useful at the level of the governorate than they are at the national level. The mismatch for Kaliuobya may be an example of this.

At the national level the supply of MOHP beds is well above the level indicated by the bed need model. Bed supply for 1996 per capita is calculated by means of the MOHP share parameter (as applied to population). Only one governorate in Scenario 1 (El Behera) shows a shortage of MOHP beds. These results probably reflect the low occupancy rates of MOHP facilities. This factor alone, moving from occupancy rates of 39 percent to the standard for Scenario 1 of 60 percent, would create a surplus of 24,595 beds in MOHP. This large change in bed needs is offset some by other aspects of Scenario 1 assumptions.

Annex Table 2: MOHP Bed Needs

Governorate	Current		Scenario 1			Scenario 2		
	Bed Supply 1996	Beds per 1000 1996	MOHP Bed Needs	Bed Surplus (shortage)	Bed Needs	MOHP Bed Needs	Bed Surplus (shortage)	Bed Needs
ALEXANDRIA	4,191	2.61	3,202	989	0.8	2,196	-1,207	0.5
ASWAN	1,882	3.06	769	1,113	0.4	1,017	96	0.5
ASYOUT	3,097	1.60	2,605	492	0.8	3,312	-2,820	1.1
BANI SWEIF	2,342	1.79	1,400	942	0.6	2,258	-1,317	1.0
CAIRO	9,030	2.80	6,804	2,226	0.8	4,418	-2,192	0.5
DAKAHLIA	4,999	1.78	4,170	829	0.8	4,808	-3,979	1.0
DOMYAT	1,955	3.16	749	1,206	0.4	1,058	148	0.5
EL-BEHERA	3,220	1.18	3,284	-64	1.0	4,720	-4,784	1.5
EL-GHARBIA	4,363	1.97	2,700	1,663	0.6	3,756	-2,092	0.9
EL-MENYA	3,989	1.71	2,781	1,208	0.7	4,050	-2,842	1.0
EL-MONOFIA	2,809	1.46	2,301	508	0.8	3,345	-2,837	1.2
EL-WADY EL GADEID	650	7.20	114	536	0.2	147	389	0.2
FAYUM	1,882	1.34	1,519	363	0.8	2,430	-2,067	1.3
GIZA	4,934	1.63	3,867	1,067	0.8	4,850	-3,782	1.0
ISMAILIA	1,152	2.44	663	489	0.6	771	-282	0.7
KAFR EL-SHEIKH	2,501	1.64	1,834	667	0.7	2,634	-1,967	1.1
KALIUOBYA	5,564	2.49	2,783	2,781	0.5	3,715	-935	0.7
KENA	2,437	1.44	2,041	396	0.8	2,920	-2,525	1.2
LUXOR	358	1.87	278	80	0.8	262	-182	0.7
MATROOH	530	3.86	175	355	0.3	221	134	0.4
NORTH SINAI	442	2.55	222	220	0.5	275	-55	0.6
PORT SAID	1,181	5.12	369	812	0.3	316	496	0.3
RED SEA	290	2.74	146	144	0.5	152	-8	0.5
SHARKIA	4,198	1.40	4,185	13	1.0	5,161	-5,148	1.2
SOHAAG	3,399	1.54	2,946	453	0.9	3,825	-3,372	1.1
SOUTH SINAI	193	4.28	57	136	0.3	72	64	0.4
SUEZ	751	3.44	363	388	0.5	299	89	0.4
TOTAL	**72,339**	**1.90**	**52,329**	**20,010**	**0.7**	**62,990**	**-42,979**	**0.9**

Annex C: Methodology for Examination of Convenient Care Requirements in Alexandria Hospitals

In order to create a bed needs model for Egypt, data and patients were needed to estimate specialty mix and to develop norms for referrals from rural to more specialized urban facilities. The model began its bed needs assessment with utilization data from a sample of 13 Alexandria hospitals from all sectors. Later the model was recommended to be expanded to the national level. Population and bed supply data were collected on the national level but constraints on time factor and resources limited utilization data collection to Alexandria hospitals. Knowing that Alexandria is not representative of all governorates (being only an urban governorate), utilization data must be collected from a governorate with urban and rural areas in order to refine norms used in the bed needs model.

Verification was conducted on hospital data (collected for Cost analysis by DDM) for hospitals in Bani Sweif and Dakahlia.

Data Collection. A retrospective study of inpatient medical records was taken from a sample of 13 Alexandria hospitals. The hospitals, chosen by the bed needs committee, were from all sectors: MOHP, HIO, university (general, district and specialized hospitals), and private hospitals. Additional selection criteria included the site of the hospital, the number of beds, and the availability of good medical records. The data collected constituted all the discharged cases during the month of March 1998 (the month with average occupancy rate in the year).

Sample Description. A total of 17,250 records were studied and constituted the following items: patient serial number, age, sex, diagnosis and length of stay. The data were taken from the admissions/discharges inpatient records or from the patient files by PHR's Dr. Wessam El Beih and assistants.

Analysis of Data. The data were entered into a database system on an excel sheet and classified by main diagnosis into urgent (e.g., accidents, labor, appendicitis, etc.), simple (e.g. sebaceous cyst, abscess, etc.) and others (e.g., diabetes, chronic renal failure, liver cirrhosis, etc.) in order to estimate the percentage of leakage due to the need of convenience for a nearby facility. That is, urgent and simple cases would most probably use a nearby facility; other cases would use a nearby facility or any other. The calculation of the need of convenience was based on the percentage of bed days of one group versus the others. This classification of diagnostic urgency also was done by Dr. Wessam El Beih.

Annex Table 3: Convenient Care Requirements in Alexandria Hospitals

Hospital ID	# of cases requiring convenience to hospital for urgency or simplicity		Percentage of cases	Total # of bed-days for these cases	# of bed-days requiring convenience		Percentage of bed-days
	Urgent	Simple			Urgent	Simple	
1	1397	31	88.00%	2801	2104	39	76.50%
2	293	0	81.60%	1215	851	0	70.00%
3	2270	59	61.40%	17957	9385	162	53.10%
4	857	103	63.40%	5886	2692	302	50.80%
5	146	14	39.00%	1054	481	20	47.50%
6	129	0	92.00%	1119	1045	0	93.00%
7	779	0	94.70%	1291	1200	0	92.90%
8	124	0	53.40%	1195	643	0	53.80%
9	1	0	0.47%	18584	1510	0	8.10%
10	39	30	45.60%	1023	48	48	9.30%
11	273	0	95.40%	4711	4598	0	97.60%
12	578	6	68.50%	3033	1714	12	56.90%
13	3861	112	57.80%	34016	12654	374	38.20%
Total	10747	355	64.00%	93885	38925	957	42.00%

Annex D: Bed Needs Data and Calculation Tables Using Proposed Scenarios

Annex Table 4: Urban Data

Governorate	All Urban Beds	Urban Population 1996	Yearly Growth Rates	Urban Population 2003	Cross-governorate Adjustment	Adjusted Population	Adjusted Pop. for Urban to Rural Leakage Scenario 1	Adjusted Pop. for Urban to Rural Leakage Scenario 2	Occupancy Norm % Scenario 1	Utilization norm per 1000
ALEXANDRIA	10,978	3,328,196	1.30%	3,643,133	1.25	4,553,916	4,553,916	3,643,133	0.6	350
ASWAN	1,486	416,804	1.90%	475,501	0.90	427,951	618,347	761,380	0.6	350
ASYOUT	3,750	763,431	2.40%	901,300	1.00	901,300	1,702,810	1,984,421	0.6	350
BANI SWEIF	1,433	437,840	2.50%	520,454	0.80	416,363	866,770	1,281,276	0.6	350
CAIRO	30,012	6,789,479	1.10%	7,329,841	1.32	9,675,390	9,675,390	7,329,841	0.6	350
DAKAHLIA	3,494	1,175,333	1.90%	1,340,850	1.10	1,474,935	2,748,781	2,905,772	0.6	350
DOMYAT	1,723	251,087	2.10%	290,405	0.90	261,365	491,363	635,749	0.6	350
EL-BEHERA	2,074	910,896	2.10%	1,053,535	0.90	948,182	2,012,446	2,651,530	0.6	350
EL-GHARBIA	5,972	1,057,152	1.70%	1,189,554	0.90	1,070,598	1,862,318	2,378,322	0.6	350
EL-MENYA	2,308	642,957	2.30%	753,896	0.90	678,506	1,615,341	2,160,555	0.6	350
EL-MONOFIA	2,177	548,814	2.20%	639,119	0.90	575,207	1,346,418	1,797,094	0.6	350
EL-WADY EL-GADEID	346	68,419	2.30%	80,224	0.90	72,202	97,967	118,910	0.6	350
FAYUM	928	446,972	2.50%	531,309	0.81	430,360	925,054	1,356,625	0.6	350
GIZA	8,474	2,590,357	2.50%	3,079,120	0.90	2,771,208	3,551,219	4,250,307	0.6	350
ISMAILIA	1,390	340,737	2.80%	413,401	1.00	413,401	564,612	617,740	0.6	350
KAFR EL-SHEIKH	1,388	509,774	2.10%	589,601	0.90	530,640	1,124,469	1,481,235	0.6	350
KALIUOBYA	6,762	1,345,967	2.80%	1,633,000	0.90	1,469,700	2,181,250	2,701,394	0.6	350
KENA	1,092	517,320	2.10%	598,328	0.91	544,479	1,218,841	1,599,758	0.6	350
LUXOR	378	360,503	2.70%	434,412	0.91	395,315	395,315	434,412	0.6	350
MATROOH	448	112,398	2.80%	136,367	0.90	122,731	158,898	190,673	0.6	350
NORTH SINAI	268	149,143	4.00%	196,262	0.89	174,673	215,080	257,615	0.6	350
PORT SAID	1,603	469,533	1.60%	524,713	1.00	524,713	524,713	524,713	0.6	350
RED SEA	232	138,571	5.70%	204,267	0.89	181,797	189,278	215,626	0.6	350
SHARKIA	2,744	968,460	2.30%	1,135,563	1.05	1,192,341	2,553,224	2,887,022	0.6	350
SOHAAG	1,875	684,046	2.50%	813,116	1.00	813,116	1,778,533	2,117,733	0.6	350
SOUTH SINAI	70	29,323	6.50%	45,568	0.89	40,555	52,148	63,170	0.6	350
SUEZ	1,021	417,610	2.50%	496,407	1.04	516,263	516,263	496,407	0.6	350
TOTAL	94,426	25,471,122		29,049,245		31,177,208	43,540,767	46,842,412	0.6	350

Annex Table 4: Urban Data cont'd

Governorate	Bed Needs Per 1000 Scenario 1	Urban Bed Needs Scenario 1	Occupancy Norm % Scenario 2	Utilization Norm Per 1000 Scenario 2	Bed Needs Per 1000 Scenario 2
ALEXANDRIA	1.6	7,278	0.7	350	1.4
ASWAN	1.6	988	0.7	350	1.4
ASYOUT	1.6	2,721	0.7	350	1.4
BANI SWEIF	1.6	1,385	0.7	350	1.4
CAIRO	1.6	15,463	0.7	350	1.4
DAKAHLIA	1.6	4,393	0.7	350	1.4
DOMYAT	1.6	785	0.7	350	1.4
EL-BEHERA	1.6	3,216	0.7	350	1.4
EL-GHARBIA	1.6	2,976	0.7	350	1.4
EL-MENYA	1.6	2,582	0.7	350	1.4
EL-MONOFIA	1.6	2,152	0.7	350	1.4
EL-WADY EL-GADEID	1.6	157	0.7	350	1.4
FAYUM	1.6	1,478	0.7	350	1.4
GIZA	1.6	5,675	0.7	350	1.4
ISMAILIA	1.6	902	0.7	350	1.4
KAFR EL-SHEIKH	1.6	1,797	0.7	350	1.4
KALIUOBYA	1.6	3,486	0.7	350	1.4
KENA	1.6	1,948	0.7	350	1.4
LUXOR	1.6	632	0.7	350	1.4
MATROOH	1.6	254	0.7	350	1.4
NORTH SINAI	1.6	344	0.7	350	1.4
PORT SAID	1.6	839	0.7	350	1.4
RED SEA	1.6	302	0.7	350	1.4
SHARKIA	1.6	4,080	0.7	350	1.4
SOHAAG	1.6	2,842	0.7	350	1.4
SOUTH SINAI	1.6	83	0.7	350	1.4
SUEZ	1.6	825	0.7	350	1.4
TOTAL	1.6	69,586	0.7	350	1.4

Annex Table 5: **Rural Data**

Governorate	All Rural Beds	Rural Population 1996	Yearly Growth Rates	Rural Population 2003	Cross-gov. Adjustment	Adjusted Population	Rural to Urban Leakage Norm Scenario 1	Rural to Urban Leakage Norm Scenario 2	Adjusted Population Scenario 1	Adjusted Population Scenario 2
ALEXANDRIA	0	0	1.30%	0	1.25	0	0.667	0.55	0	0
ASWAN	797	556867	1.90%	635,288	0.90	571,759	0.667	0.55	381,363	349,408
ASYOUT	1796	2038754	2.40%	2,406,936	1.00	2,406,936	0.667	0.55	1,605,426	1,323,815
BANISWEIF	1120	1422340	2.50%	1,690,715	0.80	1,352,572	0.667	0.55	902,166	929,893
CAIRO	0	0	1.10%	0	1.32	0	0.667	0.55	0	0
DAKAHLIA	3596	3048322	1.90%	3,477,604	1.10	3,825,364	0.667	0.55	2,551,518	1,912,682
DOMYAT	1170	663527	2.10%	767,430	0.90	690,687	0.667	0.55	460,688	422,087
EL-BEHERA	2438	3070313	2.10%	3,551,100	0.90	3,195,990	0.667	0.55	2,131,725	1,953,105
E-LGHARBIA	1847	2347675	1.70%	2,641,707	0.90	2,377,536	0.667	0.55	1,585,817	1,452,939
EL-MENYA	2674	2665918	2.30%	3,125,908	0.90	2,813,317	0.667	0.55	1,876,483	1,719,250
EL-MONOFIA	2009	2209685	2.20%	2,573,278	0.90	2,315,950	0.667	0.55	1,544,739	1,415,303
EL-WADY EL GADEID	344	73318	2.30%	85,969	0.90	77,372	0.667	0.55	51,607	47,283
FAYUM	1062	1542909	2.50%	1,834,034	0.81	1,485,567	0.667	0.55	990,874	1,008,719
GIZA	1303	2189508	2.50%	2,602,637	0.90	2,342,373	0.667	0.55	1,562,363	1,431,450
ISMAILIA	632	374272	2.80%	454,087	1.00	454,087	0.667	0.55	302,876	249,748
KAFR EL-SHEIKH	1562	1,713,146	2.10%	1,981,411	0.90	1,783,270	0.667	0.55	1,189,441	1,089,776
KALIUOBYA	1401	1,956,893	2.80%	2,374,209	0.90	2,136,788	0.667	0.55	1,425,237	1,305,815
KENA	1499	1,924,100	2.10%	2,225,399	0.91	2,025,113	0.667	0.55	1,350,750	1,223,969
LUXOR	0	0	2.70%	0	0.91	0	0.667	0.55	0	0
MATROOH	171	99468	2.80%	120,680	0.90	108,612	0.667	0.55	72,444	66,374
NORTH SINAI	174	103607	4.00%	136,340	0.89	121,342	0.667	0.55	80,935	74,987
PORT SAID	0	0	1.60%	0	1.00	0	0.667	0.55	0	0
RED SEA	122	17124	5.70%	25,242	0.89	22,466	0.667	0.55	14,985	13,883
SHARKIA	3,270	3319388	2.30%	3,892,131	1.05	4,086,738	0.667	0.55	2,725,854	2,140,672
SOHAAG	2,185	2438954	2.50%	2,899,150	1.00	2,899,150	0.667	0.55	1,933,733	1,594,532
SOUTH SINAI	123	25172	6.50%	39,117	0.89	34,814	0.667	0.55	23,221	21,514
SUEZ	0	0	2.50%	0	1.04	0	0.667	0.55	0	0
TOTAL	31,391	33,801,260		39,540,371	1.00	37,127,804	0.667	0.55	24,764,245	21,747,204

Annex Table 5: **Rural Data**

Governorate	Number of People Leaving Rural Areas		Occupancy Norm %	Utilization norm per 1000	Bed Needs per 1000	Rural Bed Needs	Occupancy Norm %	Utilization Norm per 1000	Bed Needs Personal 1000
	Scenario 1	Scenario 2	Scenario 1	Scenario 1	Scenario 1	Scenario 1	Scenario 2	Scenario 2	Scenario 2
ALEXANDRIA	0	0	0.5	250	1.4	0	0.6	350	1.6
ASWAN	190,396	285,880	0.5	250	1.4	522	0.6	350	1.6
ASYOUT	801,510	1,083,121	0.5	250	1.4	2,199	0.6	350	1.6
BANISWEIF	450,407	760,822	0.5	250	1.4	1,236	0.6	350	1.6
CAIRO	0	0	0.5	250	1.4	0	0.6	350	1.6
DAKAHLIA	1,273,846	1,564,922	0.5	250	1.4	3,495	0.6	350	1.6
DOMYAT	229,999	345,344	0.5	250	1.4	631	0.6	350	1.6
EL-BEHERA	1,064,265	1,597,995	0.5	250	1.4	2,920	0.6	350	1.6
E-LGHARBIA	791,720	1,188,768	0.5	250	1.4	2,172	0.6	350	1.6
EL-MENYA	936,835	1,406,659	0.5	250	1.4	2,571	0.6	350	1.6
EL-MONOFIA	771,211	1,157,975	0.5	250	1.4	2,116	0.6	350	1.6
EL-WADY EL GADEID	25,765	38,686	0.5	250	1.4	71	0.6	350	1.6
FAYUM	494,694	825,315	0.5	250	1.4	1,357	0.6	350	1.6
GIZA	780,010	1,171,187	0.5	250	1.4	2,140	0.6	350	1.6
ISMAILIA	151,211	204,339	0.5	250	1.4	415	0.6	350	1.6
KAFR EL-SHEIKH	593,829	891,635	0.5	250	1.4	1,629	0.6	350	1.6
KALIUOBYA	711,550	1,068,394	0.5	250	1.4	1,952	0.6	350	1.6
KENA	674,363	1,001,429	0.5	250	1.4	1,850	0.6	350	1.6
LUXOR	0	0	0.5	250	1.4	0	0.6	350	1.6
MATROOH	36,168	54,306	0.5	250	1.4	99	0.6	350	1.6
NORTH SINAI	40,407	61,353	0.5	250	1.4	111	0.6	350	1.6
PORT SAID	0	0	0.5	250	1.4	0	0.6	350	1.6
RED SEA	7,481	11,359	0.5	250	1.4	21	0.6	350	1.6
SHARKIA	1,360,884	1,751,459	0.5	250	1.4	3,734	0.6	350	1.6
SOHAAG	965,417	1,304,617	0.5	250	1.4	2,649	0.6	350	1.6
SOUTH SINAI	11,593	17,603	0.5	250	1.4	32	0.6	350	1.6
SUEZ	0	0	0.5	250	1.4	0	0.6	350	1.6
TOTAL	12,363,559	17,793,167	0.5	250	1.4	33,924	0.6	350	1.6

Annex E: Proposed Data Collection Forms

The forms in this annex were designed to be completed annually by the undersecretary in each governorate to (1) inventory all Egyptian hospitals and their operating statistics and location and (2) inventory all population centers (cities, towns, and villages) with over 10,000 residents. These data could be linked together to better understand the frequency of isolated places without beds. The unit of analysis for the refined model would be the village/town or city (rather than the urban/rural division) of the governorate. This would permit travel and village isolation to be considered in the computation of bed need.

Inpatient Facility Inventory Form*

Name of Facility _____	Location (City, Village) _____
Address _____	District (Center, Segment) _____
Telephone # _____	Director _____
Type of Facility** _____	Ownership*** _____

Utilization Statistics for 1998

Number of Beds on Jan. 1 _____	Number of Beds Dec. 31 _____
Bassinets/Incubators Jan. 1 _____	Bassinets/Incubators Dec. 31 _____
Total Admissions 1998 _____	Total Bed-days 1998† _____
Deliveries _____	Baby Bed-days 1998 _____
Outpatient Visits 1998 _____	Total Employees Dec. 31 _____
Number of MDs Dec. 31 _____	Number of Nurses Dec. 1998 _____
Number of Dentists/Pharms _____	Number of Technicians _____

*This form should be completed for every facility with inpatient hospital beds in the governorate.
**General hospital, specialized hospital (specify), district, rural hospital, rural group.
***MOHP, HIO, University, Private, CCO
†Exclude days for newly born babies.

City and Village Inventory Form

Name of City/Village _____ Health District _____

Population Estimates for Dec. 31, 1998

Age	Male	Female
0-		
5-		
16-		
45-		
60+		

Number of MDs on Dec. 31, 1998 _____

Number of Dentists on Dec. 31, 1998 _____

Births in 1998 _____

Stillborn/Neonatal Deaths in 1998 _____

*This form is to be completed for every place (city, town, village) in the governorate with population exceeding 5,000 persons.

Annex F: Health Status and Utilization Between Low and High Income Population

This table shows health status as perceived by the surveyed population.

Annex Table 6: **Health Status and Utilization between Low and High Income Population**

Health Status	Annual Income >1114 L.E.	Days	LOS	Annual Income <1114 L.E.	Days	LOS
Excellent Health	0.0167	0.0692	4.1437	0.0159	0.0624	3.9245
Very Good Health	0.0181	0.1009	5.5746	0.0094	0.0598	6.3617
Good Health	0.0272	0.2183	8.0257	0.0142	0.1008	7.0986
Satisfactory Health	0.0575	0.7287	12.673	0.0381	0.4542	11.9213
Poor Health	0.1023	1.412	13.803	0.0766	1.1105	14.4974